

P1.9 Internal Reflection Sensor for the Cone Penetrometer

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Abstract

This project involves the development of a prototype Internal Reflection Sensor (IRS) for the detection of NonAqueous Phase Liquids (NAPLs) in soil and groundwater. The IRS is designed to be deployed with a cone penetrometer or similar "push" technology and will monitor in real-time for both Dense NAPLs such as trichloroethylene, perchloroethylene, and other chlorinated hydrocarbon solvents as well as Light NAPLs such as gasoline and other fuels. Therefore, the IRS will provide rapid, on-site *in situ* analysis that can improve the quality, reduce the costs, and enhance the safety of characterization and monitoring activities.

The IRS is a simple, inexpensive device with no moving parts which renders it well suited for cone penetrometer deployment. When a NAPL is encountered by the sensor, the voltage signal from a detector decreases virtually instantaneously. For real-time monitoring, the IRS is connected through an electrical cable to a simple readout device or computer in the cone penetrometer truck.

Progress to date has been to assemble a breadboard test system to establish sensor specifications and design criteria. Using the breadboard system, it has been demonstrated that a sensor can be designed to detect a wide range of NAPLs without responding to soil, water, or other natural subsurface constituents. We are currently completing the sensor design and will fabricate a working prototype over the next several months. This will be followed by laboratory testing and field evaluation at a NAPL contaminated site.

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